

Transcription

I. Nucleic Acids

- A. Differences
- B. Gene
 - 1. coding region
- C. Central Dogma of Molecular Biology
- D. Template
- E. RNA structure
 - 1. hairpins
 - 2. stem-loop

II. Structure Overview

- A. @ DNA level
 - 1. +1
 - 2. upstream = 5'
 - 3. downstream = 3'
- B. @ RNA level
 - 1. transcript
 - 2. 5' & 3'
- C. Error rate

III. Transcription Overview

- 1. initiation
 - a. transcription bubble
- 2. strand elongation
 - a. pyrophosphate
 - b. stability
- 3. termination

IV. Types of RNA

- A. Regulating RNA molecules
 - 1. micro RNAs = miRNA
 - a. RISC
 - 2. snRNA
 - 3. lncRNA
- B. siRNA
 - 1. RNAi
 - a. dicer
 - 1) RITS

V. Transcription and Gene Structure

- A. Amplification
- B. Prokaryotic transcription
 1. RNA polymerase
 - a. sigma factor
 2. promoter
 3. terminator
 4. operon
 - a. polycistronic
- C. Eukaryotic transcription
 1. Transcription-control regions
 - a. promoter
 - b. control elements
 - c. enhancers
 2. RNA polymerases
 3. general transcription factors
 - a. TFIID
 - b. TFIIB
 - c. TFIIH
 4. Enhancers

VI. RNA Processing

- A. Prokaryotic
 1. polycistronic
- B. Eukaryotic
 - a. monocistronic
 1. RNA cap
 - a. process
 - b. why
 2. polyadenylation
 - a. sequences
 - b. cleavage/polyadenylation complex
 - 1) poly(A) polymerase (PAP)
 - c. poly(A) tail
 3. RNA splicing
 - a. introns & exons
 - 1) recognition seqs
 - b. spliceosome
 - 1) snRNAs
 - 2) snRNPs
 - c. process
 - 1) lariat structure
 - d. alternative splicing
 4. export
 - a. export proteins

VII. RNA degradation

- A. Half life
- B. Pathways of mRNA degradation
 1. deadenylation
 2. deadenylation-independent decapping pathway
 3. endonucleolytic pathway
- C. Additional control
 1. miRNAs
 2. siRNAs
 3. half life control